

Amendments to the Drawings:

The attached replacement drawing sheet makes changes to Fig. 2A and replaces the original sheet with Fig. 2.

Attachment: Replacement Sheet

REMARKS

Claims 1, 2, 14, 16, 17 and 23 are pending in this application. By this Amendment, the drawings and claim 1 are amended, and claims 3-13, 15, 18-22 and 24-37 are canceled without prejudice to or disclaimer of the subject matter contained therein. Applicants reserve the right to file a Divisional application at a later time. No new matter is added.

I. Formal Matters

The Office Action objects to the specification as being improper for incorporating essential matter in the specification. By this Amendment, the reference to the foreign application, on page 1, has been removed from the specification. Thus, withdrawal of the rejection is respectfully requested.

The Office Action objects to the Disclosure for containing informalities.

The Amendment is responsive to the objection. In particular, Fig. 2A has been amended as "Fig. 2" to reflect the originally filed specification. In regards to the informalities on pages 17 and 22, the specification has been amended to remove the typographical errors. Thus, withdrawal of the objection is respectfully requested.

The Office Action objects to the drawings as failing to comply with 37 C.F.R. §1.84(p)(5) because the drawings include a reference sign not mentioned in the specification. By this Amendment, the reference label "EH" has been added on page 8, line 8. Thus, withdrawal of the objection is respectfully requested.

II. The Claims Define Patentable Subject Matter

The Office Action rejects claims 1-2, 14, 16-17 and 23 under 35 U.S.C. §102(b) as being anticipated by Van Hook et al. (hereinafter "Van Hook"), U.S. Patent No. 4,026,823. The rejection is respectfully traversed.

Applicants' invention relates to a fuel reforming apparatus for reforming a raw fuel containing a hydrocarbon-containing compound so as to produce a hydrogen-rich fuel gas for

use in a fuel cell having a reformer with a reforming catalyst, a raw fuel supply device, a water supply device, an oxygen supply device, and a controller that controls the raw fuel supply device, the water supply device and the oxygen supply device, wherein the controller executes a normal operation of the reformer and a carbon removing process for removing carbon deposited on the reforming catalyst, by controlling at least one of an amount of the raw fuel supplied to the reformer and an amount of the oxygen supplied to the reformer so that an O/C ratio of the number of oxygen atoms supplied from the oxygen supply device to the number of carbon atoms contained in the raw fuel supplied from the raw fuel device becomes larger than an appropriate range of the O/C ratio that is to be established during the normal operation of the reformer.

In other words, the controller in Applicants' invention executes a normal operation process of the reformer and a carbon removal process that switches both processes based on an amount of the carbon deposited on the reforming catalyst. Further, the carbon removal process, at least one of an amount of a raw fuel supplied to a reformer and an amount of oxygen supplied to the reformer is controlled so that an O/C ratio becomes larger than an appropriate range of the O/C ratio during the normal operation process of the reformer.

That is, the amount of carbon deposited and accumulated on the reforming catalyst is effectively reduced by suitably controlling the amount of the raw fuel, water and oxygen that are supplied to the reformer, as described on page 11, lines 24-26 in Applicants' disclosure. In particular, the carbon removal process only requires controlling the amount of the oxygen and/or the raw fuel to be supplied so that the O/C ratio exceeds the appropriate range for the normal operation process of the reformer, as further described on page 19, lines 5-8.

By contrast, Van Hook discloses the approach for removing carbon deposits is to operate at high ratio of steam-to-carbon, rather than controlling the amount of oxygen-to-carbon O/C supplied to the reformer. Further, Van Hook discloses that the oxygen-containing

gas used for partial oxidation reaction is supplied to a reformer during activity-regenerating catalyst treatment. However, it is respectfully submitted that Van Hook does not disclose that the carbon deposited on the catalyst is removed by increasing the O/C ratio so that the O/C ratio becomes larger than an appropriate range of the O/C ratio that is to be established during a normal operation. In other words, Van Hook does not disclose that a reforming apparatus executes both a normal operating process and a carbon process, whereby the carbon removal process can be executed even in the operating mode of the reforming apparatus.

Accordingly, Van Hook fails to disclose or suggest the controller executes a normal operation of the reformer and a carbon removing process for removing carbon deposited on the reforming catalyst, by controlling at least one of an amount of the raw fuel supplied to the reformer and an amount of the oxygen supplied to the reformer so that an O/C ratio of the number of oxygen atoms supplied from the oxygen supply device to the number of carbon atoms contained in the raw fuel supplied from the raw fuel device becomes larger than an appropriate range of the O/C ratio that is to be established during the normal operation of the reformer, as recited in claim 1.

Because Van Hook does not disclose each and every feature of the claimed invention, it can not provide a basis for rejection under 35 U.S.C. §102. Thus, reconsideration and withdrawal of the rejection are respectfully requested.

The Office Action rejects claims 2 and 17 under 35 U.S.C. §103(a) as being unpatentable over Van Hook. The rejection is respectfully traversed.

As discussed above, Van Hook neither discloses nor suggests the claimed invention as found in claim 1, the independent claim from which the rejected claims depend. Thus, Van Hook fails to disclose claimed invention, including the additional features recited in claims 2 and 17.


For at least these reasons, Applicants respectfully submit that Van Hook fails to disclose or render obvious the features recited in independent claim 1. Claims 2, 14, 16, 17 and 23, which depend from independent claim 1 are likewise distinguishable over the applied art for at least the reasons discussed, as well as for the additional features they recite. Reconsideration and withdrawal of the rejections are respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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JAO:DJC/gew

Attachment:
Petition for Extension of Time
Fig. 2

Date: December 18, 2003

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